(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number : 0 561 612 A2

(12) EUROPEAN PATENT APPLICATION

(21) Application number : 93301981.2

(22) Date of filing : 16.03.93

(51) Int. Cl.^{5} : D01D 5/32, D01D 5/098

(30) Priority : 17.03.92 JP 60512/92

(43) Date of publication of application : 22.09.93 Bulletin 93/38

(84) Designated Contracting States : DE DK FR GB IT

(71) Applicant : Chisso Corporation
6-32, Nakanoshima 3-chome Kita-ku
Osaka-shi Osaka-fu (JP)

(72) Inventor : Terakawa, Taiju
1036-9, Nishigawara, Chuzucho
Yasu-gun, Shiga-ken (JP)
Inventor : Nakajima, Sadaaki
105, Karihara, Rittocho
Kurita-gun, Shiga-ken (JP)

(74) Representative : Lamb, John Baxter et al
MARKS & CLERK 57-60 Lincoln's Inn Fields
London WC2A 3LS (GB)

(54) Spinneret device for conjugate melt-blow spinning.

(57) A spinneret device for side-by-side, conjugate melt-blow spinning is provided, which device can correspond to combinations of various heterogeneous polymers for conjugate spinning and is uniform in the conjugate state such as conjugate ratio between single fibers, the proportion of the peripheral percentage of both the components in the fiber cross-section, etc. and is small in the fineness unevenness as well as it has a large width of nozzle plate and a superior productivity,

and which device is composed mainly of a spinning resins-feeding plate 2 ; a distributing plate 3 ; a separating plate 4 provided with confluent groove 12 of conjugate components engraved at the bottom part of the plate 4, provided corresponding to the number of spinning nozzles ; a nozzle plate 5 ; and a plate 6 for controlling the clearance for a gas,

and according to which device, even when the viscosity unevenness, spinning temperature unevenness, etc. of the spinning resins occur in the cavity of the nozzle plate 5 to some extent, microfine fiber can be obtained which is uniform in the composite ratio and the cross-sectional, peripheral percentages of the respective components in the fiber cross-section, and

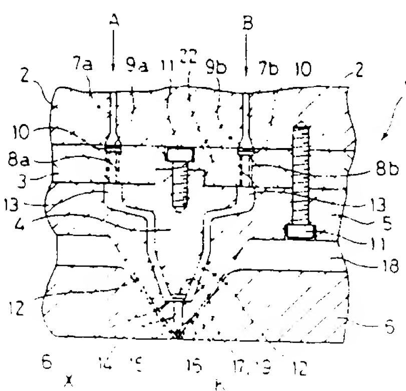


FIG.1

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to a spinneret device for conjugate melt-blow spinning. More particularly it relates to a spinneret device for side-by-side type conjugate melt-blow spinning wherein two kinds of spinning dopes are melt-extruded from spinning nozzles to form side-by-side conjugate fibers, followed by blown-spinning the extruded unstretched fibers by means of a high speed gas current. Microfine fibers obtained by means of such a spinning device are processed into a web-form product, a non-woven fabric or a molded product and used for a mask, a filter for precision filtration, a battery separator, a hygienic material, a thermal insulant, etc.

Description of the Prior Art

The so-called melt-blow spinning wherein a thermoplastic synthetic resin is melt-extruded from spinning nozzles followed by spouting a high temperature gas at a high speed from clearances provided on both sides of the spinning nozzles onto the extruded unstretched fibers to effect blow-spinning, makes it possible to obtain microfine fibers such as those having a fiber diameter of 10 μm or less. Since spinning of fibers and production of a non-woven fabric are carried out successively, the above process is advantageous for producing a non-woven fabric of microfine fibers.

There are two ways for a melt-blow spinning, one of which is by means of non-conjugate fibers and the other is by means of conjugate fibers.

As to the melt-blow spinning of non-conjugate fibers, its device and spinning process are disclosed in Industrial and Engineering Chemistry, Vol. 48, No. 8, pp 1342-1346, 1956. Japanese patent application laid-open No. Sho 50-46972 and Japanese patent application laid-open No. Sho 54-134177 disclose a process wherein spinning is carried out while decomposing polymer or while keeping the spinning conditions such as the apparent viscosity, extrusion temperature, etc. of polymer within specified critical ranges, along with an apparatus therefor. However the above-mentioned references do not disclose any spinning of conjugate fibers.

As to the so-called conjugate melt-blow spinning directed to conjugate fibers, Japanese patent application laid-open No. Sho 60-99057 and Japanese patent application laid-open No. Sho 60-99058 disclose a spinneret device for side-by-side conjugate melt-blow spinning and a spinning process. According to these publications, it has been regarded as possible to produce microfine fibers according to side-by-side type conjugate, melt-blow spinning process, even in combinations of heterogeneous polymers such as polyester/polypropylene, nylon 6/polypropylene, etc. as conjugate components.

In the spinneret device and the production process of conjugate fibers disclosed in the above two publications, it has been regarded that viscosities of heterogeneous polymers passing through the die should be generally similar, and can be achieved by controlling the temperature and retention time inside the extruder, composition of polymer, etc. Namely, in the production process, only when the heterogeneous polymers reach a spinning nozzles in a state where the respective extrusion temperatures and retention times have been controlled so that the respective viscosities have become almost equal, and also flow through the inside of the spinneret while retaining the balance between the respective viscosities, the polymers can form a conjugate mass which is then extruded through nozzles of the spinneret without any notable turbulence or break at the conjugate portions to form conjugate blown fibers. However, according to such a spinneret device, it is possible to obtain uniform conjugate melt-blown fibers only when the temperature and retention time inside an extruder and the composition of the polymers, etc. are controlled precisely while employing a relatively small spinneret which retention time is short, without taking productivity into consideration. Namely, when a spinneret device having a commercial productivity is taken into consideration, the following problems occurs. When a viscosity difference has occurred between the respective melted polymers due to the variation in the molecular weights of the polymers, themselves, and a slight variation in the extrusion temperatures, then turbulence of flow of the polymers melted inside the spinneret device occurs, it is impossible to obtain a uniform conjugate mass inside the cavity of the spinneret device, and hence it is impossible to form uniform, conjugate blown fibers. Further, even if the temperature inside the extruder might have been precisely controlled so as to maintain the viscosities of the polymers at definite values, when a large spinneret is used for productivity, polymers having different fluidities flow through the spinneret kept at the same temperature, so that the retention time inside the spinneret device is prolonged and hence the viscosity balance is broken due to the difference of fluidities of the polymers to make it impossible to form uniform, conjugate blown fibers, and yet the fineness uneven-

jugate melt-blow spinning.

Fig. 18 shows a side, cross-sectional, schematic view of a conventional spinneret device for conjugate melt-blow spinning.

Fig. 19 shows a front, cross-sectional, schematic view of a conventional spinneret device for conjugate melt-blow spinning, having a circular pipe part.

Japanese patent application laid-open No. Hei 2-289107 discloses a side-by-side type, conjugate, melt-blow spinneret device provided with a slender groove-form, confluent resin flow-controlling part 24 having a defined ratio of length to thickness in the length direction of the spinneret, engraved at the bottom part of the nozzle plate 5 in the length direction, nozzle plate 5 having spinning holes 15 engraved at the above bottom part, and separating plates 4 for separating two kinds of melted resins, provided in the cavity of the device (see Figs. 17 and 18). Further, the above publication also discloses a spinneret having a circular pipe part 25 for inserting a mixer into the bottom of the confluent resin flow-controlling part 23 (see Fig. 19). According to the device, the engraved, confluent resin flow-controlling part has the defined ratio of length to thickness in the length direction of the spinneret, therefore even when spinning melted resins which viscosities are somewhat different with each other are used as the first component and the second component of the conjugate fibers, the conjugate ratio, the fineness unevenness, etc. are somewhat improved, as compared with the prior art of the above publications, but since any mechanism for a uniform confluence of conjugate components and for a uniform distribution of these components corresponding to the respective spinning nozzles are not provided, the above-mentioned problems have not yet been solved.

As described above, in any of the above prior art, no consideration has been taken about a uniform confluence mechanism and a uniform distribution mechanism of conjugate components directed to all of the individual spinning nozzles.

SUMMARY OF THE INVENTION

The object of the present invention is to provide a spinneret device for side-by-side, conjugate melt-blow spinning, which can correspond to combinations of various kinds of heterogeneous polymers and yet be uniform in the conjugate state such as a conjugate ratio between extruded single fibers, a proportion of peripheral percentages of both the components in the fiber cross-section, etc. and also be uniform in the kinds of polymers only by exchange of a separating plate which price is low. Still another object is to provide a spinneret device having a large width of spinneret and a superior productivity.

The present invention has the following constitutions:

(1) A spinneret device for side-by-side conjugate melt-blow spinning, provided with a spinning resins-feeding plate 2 having spinning resins-introducing grooves for introducing two kinds of spinning resins into distributing grooves of a distributing plate 3, respectively engraved therein; the distributing plate 3 having distributing grooves for distributing the spinning resins fed from the spinning resins-feeding plate 2; a nozzle pate 5 having a cavity 13 for receiving a separating plate 4, engraved on the back surface thereof, and also having holes 14 for introducing a conjugate component and spinning nozzles 15 bored successively on the bottom surface X of the cavity 13 thereof; a separating plate 4 having its bottom part engraved so that confluent grooves 17 for combining the above-mentioned different spinning resins may intersect the length direction of the grooves and also the confluent grooves 17 may be positioned on the central axis of the spinning nozzles 15; and a clearance for spouting a gas, provided around the nozzle plate 5 and toward the exit of the spinning nozzles 15.

2. A spinneret device for side-by-side, conjugate melt-blow spinning according to item 1, wherein the distributing grooves of the distributing plate 3 are engraved in the length direction of the back surface of the distributing plate 3; distributing holes for leading the spinning resins into grooves 13 for receiving the spinning resins, of the nozzle plate 5 are bored in the distributing grooves; partitioning walls are formed between the respective confluent grooves 17 of the separating plate 4; and the clearance for spouting a gas is formed between the nozzle plate 5 and a plate 6 for controlling the clearance for a gas, provided around the nozzle plate 5.

3. A spinneret device for side-by-side conjugate melt-blow spinning according to item 1 or item 2, wherein the bottom surface K of the walls for partitioning the confluent grooves of the separating plate 4 is closely contacted to the bottom surface X of the cavity of the nozzle plate 5.

4. A spinneret device for side-by-side conjugate melt-blow spinning according to item 1 or item 2,

5. A spinneret device for side-by-side conjugate melt-blow spinning according to item 1 or item 2, wherein a narrow clearance D_1 is provided between the bottom surface K of the walls for partitioning the confluent grooves of the separating plate 4 and the bottom surface X of the cavity of the nozzle plate, and the D_1 is smaller than either of the width W_3 of the grooves 12 for controlling the pressure of the spinning resins and the depth D_2 of the grooves 17.

6. A spinneret device for side-by-side conjugate melt-blow spinning according to item 5, wherein the depth D_2 of the grooves of the separating plate 4 is smaller than the width W_3 of the grooves 12 for controlling the pressure of the spinning resins.

BRIEF DESCRIPTION OF THE DRAWINGS OF THE INVENTION

Fig. 1 shows a front, schematic, cross-sectional view of the spinneret device for conjugate melt-blow spinning.

Fig. 2 shows an enlarged, cross-sectional view of the lower part of the nozzle plate of Fig. 1.

Figs. 3 and 4 each show an enlarged, cross-sectional view of the side surface of the separating plate for illustrating the grooves for combining different dopes.

Figs. 5 and 6 each show an enlarged, cross-sectional view of the separating plate for illustrating the confluent grooves having introducing grooves.

Fig. 7 shows an enlarged, cross-sectional side view of the side surface of the separation plate for illustrating the confluent grooves.

Figs. 8, 9, 10, 11, 12 and 13 each show a view for illustrating the relationship between the confluent grooves and the conjugate component-introducing hole.

Fig. 14 shows a view of the plane-back surface of the distributing plate

Fig. 15 shows a view of the plane-back surface of the nozzle plate.

Fig. 16 shows a cross-sectional view of fibers.

Description of the symbols in the figures:

1:	spinneret device for conjugate melt-blow spinning,
2:	spinning melted resins-feeding plate,
3:	distributing plate.
4:	separating plate
8a:	hole for distributing the component A,
8b	hole for distributing the component B,
9a.	groove for distributing the component A,
9b:	groove for distributing the component B,
10.	filter.
11:	bolt,
12.	groove for controlling the pressure of spinning melted resins,
13	groove for receiving the spinning melted resins,
14	conjugate component-introducing hole,
15.	spinning nozzle,
16.	clearance for gas spouting,
17.	confluent groove,
18:	gas-introducing hole,
19:	confluent grooves-partitioning wall,
20.	introducing groove,
21:	bolt hole,
22:	top portion of separating plate,
23:	cavity of nozzle plate,
24:	part for controlling the confluent resin flow,
25:	circular tube part,
26.	conjugate fiber,
27.	conjugate fiber,
D_1:	a narrow clearance between the bottom face K of the confluent grooves-partitioning wall of separating plate and the bottom surface X of nozzle plate;
D_2:	depth of confluent groove,
W_1:	width of confluent groove,
W_2:	diameter of conjugate component-introducing hole,
W_3:	width of groove for controlling the pressure of spinning melted resin, L: length of confluent groove,
K:	bottom surface of confluent grooves-partitioning wall of separating plate,
X:	bottom surface of cavity of nozzle plate.

DESCRIPTION OF PREFERRED EMBODIMENTS

The embodiments of the present invention will be described below referring to the accompanying drawings.

Fig. 1 shows the front schematic cross-sectional view of the spinneret device for conjugate melt-blow spinning, and Fig. 2 shows the enlarged cross-sectional view of the lower part of the nozzle plate of Fig. 1.

This spinneret device is composed mainly composed of a plate 2 for feeding spinning melted resin A and B, having grooves 7a and 7b for introducing the

nozzle 15 bored on the bottom surface X of the cavity 13; a separating plate 4 engraved so that, at the lower part of the plate, a confluent groove 17 for confluently combining the above spinning resins can intersect the length direction and also the cofluent groove 17 can be present on the central axis of a spinning nozzle 15 ; and a clearance 16 for spouting a gas, formed toward the exit of the spinning nozzle 15, between the nozzle plate 5 and a plate 6 for controlling the clearance 16 for spouting a gas, provided outside the plate 5.

The plate 2 for feeding the spinning melted resin has grooves 7a and 7b for introducing the dope engraved in a slit form and the discharge ports thereof are engraved in a broad angle form so as to accord with the distributing grooves 9A and 9B of the distributing plate 3. The plate 2 for feeding the spinning resin may be of one member, but in the case of the instant embodiment, the plate is divided into three members of a left member, a central member and a right member as shown in Fig. 1 and these members are respectively fixed by bolts. The distributing plate 3 has distributing grooves 9a and 9b engraved in the length direction, that is, in the front and rear directions as viewed in Fig. 1. Further, at the respective bottoms thereof, a number of distributing holes 8a and 8b are bored. Further, the distributing grooves 9a and 9b have filters 10 fitted therewith, and the bottoms of the distributing grooves also function as a support of the filters. The filters 10 may be provided either on the ventral surface of the spinning resin-discharging part of the distributing holes 8a and 8b or on the spinning resin-receiving port of the plate 2. Although the distributing plate 3 and a separating plate 4 mentioned below are fixed by bolt 11 in this embodiment, they may be of a solid structure.

The cavity of the nozzle plate 5 is separated into two parts (right and left parts as viewed in Fig.2) by the separating plate 4 arranged in the cavity, to form the spinning resins-receiving grooves 13 of two rooms (see Fig. 1) and two narrow grooves 12 for controlling the pressure of the spinning resins, communicating with the grooves 13.

The upper surface of the nozzle plate 5 has a cavity for receiving a separating plate 4, engraved in the length direction, that is, in the front and rear directions as viewed in the figure, and the bottom surface X of the cavity bottom has conjugate component-introducing holes 14 and spinning nozzles 15 at the lower part of the holes 14.

In the above construction, the respective spinning melted resins of the components A and B extruded respective spinning resins pass through the respective distributing holes 8a and 8b and are discharged into the grooves 13 for receiving the spinning resins of the upper part of the nozzle plate 5. The respective spinning resins pass through the respective spinning resins-receiving grooves 13 and the grooves 12 for controlling the pressure of the spinning resins, and are combined in a confluent groove 17 at the lower part of the separating plate 4, followed by passing through the conjugate component-introducing hole 14 of the nozzle plate 5 and being spun through the spinning nozzle 15.

The bottom surface X of the cavity of the nozzle plate 5 is contacted closely to the bottom surface K of the confluent grooves-partitioning walls of the separating plate 4 mentioned below, as shown in Fig. 7, or both the surfaces are not contacted, but a narrow clearance D_1 is formed therebetween, as shown in Fig. 3. Further, when the nozzle plate 5 is cut so as to perpendicularly intersect its length direction, the resulting shape takes an inverted, equilateral triangle.

The above grooves 12 for controlling the pressure of the spinning resins refer to a clearance between the side walls of a nearly V-form part at the lower part of the separating plate 4 and the side wall of the cavity of the nozzle plate 5, as shown in Figs. 1 and 2. The width W_3 of the controlling grooves 12 is preferably about 0.5 to 10 mm. If the width is too small, the transfer speed of the spinning resins is too high, so that viscosity unevenness occurs and the pressure variation in the confluent groove occurs; hence the conjugate state is inferior. To the contrary, if the width is too large, the transfer speed of the spinning resin is too low, so that an extraordinary thermal decomposition, carbonization, etc. of the spinning resin occur.

The diameter W_2 of the conjugate component-introducing hole 14 bored in the nozzle plate 5 is preferably about 0.3 to 5 mm, and the diameter of the spinning nozzle is preferably about 0.1 to 1.5 mm. Further, the spinning nozzles are preferred to be bored at a pitch of about 0.5 to 10 mm.

The separating plate 4 is secured at its top part to the distributing plate 3 by bolts. In the separating plate 4, confluent grooves 17 are engraved at its lower part of the plate, in a plurality of rows, in the direction intersecting the length direction, that is, in the direction from the right to the left as viewed in Fig. 1. Between the respective confluent grooves 17, there are formed confluent grooves-partitioning walls 19, for example as shown in Fig. 3. The confluent grooves 17 are arranged in the

down through the grooves 12 may cause a pressure unevenness (flow quantity unevenness each spinning nozzle) over the length direction of the nozzle plate 5, which may cause conjugate ratio unevenness and fineness unevenness, the confluent grooves 17 prevent such conjugate unevenness and fineness unevenness from occurring.

The depth D_2 of the confluent grooves (see Fig. 3) is preferably about 0.1 to 5 mm and the width W_1 thereof is preferably about 0.3 to 5 mm. Further, the width W_1 of the confluent grooves 17 is preferred to be the same as the diameter W_2 of the conjugate component-introducing holes, but either of $W_1$2 (see Figs. 4 and 10) or $W_1<W_2$ (see Fig. 9) may be employed. However, the proportion of W_1 and W_2 is preferably limited to 2:1 to 1:2. If the proportion is too small or too large, the conjugate ratio becomes either uneven. As to the relationship between the length L of the confluent grooves 17 and the diameter W_2 of the conjugate component-introducing hole 14, $L<W_2$ may be employed as shown in Fig. 11. The length L is preferred to be longer as far as the processing is possible. Further, as to the confluent grooves 17, the spinning resins-introducing inlet part thereof may be broader than the center part thereof, as shown in Fig. 13. Further, when a introducing groove 20 (see Fig. 6) is provided along with the confluent grooves 17, it is possible to more effectively prevent the conjugate ratio unevenness and the fineness unevenness from occurring. The width and the depth of the introducing groove 20 may be to the same extent as the width of the confluent grooves 17, and the depth and the length thereof may be to an extent of 2 to 30 mm. This introducing groove 20 may be extended from both the end parts of the confluent grooves 17 upward of the wall of the separating plate, as shown in Figs. 5 and 6. The groove 20 is not limited to the vicinity of the lower part of the separating plate 4, but it may be engraved extending as far as the spinning resins-receiving grooves 13, for example.

The separating plate 4 is easy to subject the confluent grooves 17 to be processed for engraving and possible to be manufactured at a low cost. Hence, it is possible to provide several separating plates each being different in the dimensions of the confluent grooves 17, exchange only the separating plate 4 without exchanging an expensive nozzle plate 5, carry out trial spinning to select a separating plate affording an optimum conjugate state corresponding to the respective spinning resins.

In the present spinneret device, the bottom surface K of the confluent grooves-partitioning wall 19 of [illegible] tom surface [illegible] (D[illegible]) [illegible] is advantageous for [illegible] and ing the respective spinning nozzles, but liable to injure the bottom surface K and the bottom surface X, and since these bottom surfaces are close to the spinning nozzles, the injuries of these surfaces have a large influence upon the flow of the spinning resins, to cause a fineness unevenness of fibers. In the case of providing the narrow clearance D_1, the D_1 is preferred to be smaller than the width W_3 of the grooves for controlling the pressure of the spinning resins. Further, the D_1 is more preferred to be smaller than either of W_3 and D_2 (see Figs. 1 and 2). If D_1 is larger than W_3, a high pressure is applied onto the bottom part of the cavity of the nozzle plate (the inlet of the conjugate component-introducing hole 14), a large pressure drop is liable to occur at the part, resulting in the variation of the conjugate ratio and the fineness unevenness of fibers.

When spinning is carried out using the spinneret device of the present invention, two kinds of the spinning resins are combined uniformly in side-by-side form in the respective confluent grooves arranged just above the spinning nozzles 15, pass through the conjugate component-introducing hole 14 and are led to the spinning nozzles 15. Thus, when the viscosity difference between two kinds of the components is relatively large, or even when the viscosity unevenness, the spinning temperature unevenness, etc. occur to a certain extent in the cavity part of the nozzle plate 5, microfine fibers can be obtained which are uniform in the conjugate ratio, the cross-sectional, peripheral percentages of the respective components in the fiber cross-section, etc. and yet small in the fineness unevenness of the fiber.

The unstretched fibers extruded from the spinning nozzles 15 are stretched and at the same time cut into short fiber form, by spouting a high temperature and high pressure gas introduced from the gas-introducing hole 18 through a clearance 16 for gas spouting, followed by being collected in the form of a microfine fiber web by a collecting means arranged at below the nozzle plate 15. As the spouting gas, an innert gas such as air, nitrogen gas, etc. is used, and its temperature may be about 100° to 500°C and its pressure may be about 0.5 to 6 Kg/cm^2. Further, the clearance 16 for the gas spouting may be arranged not only in one way as shown in Fig. 1, but also in two ways.

The cross-section of the thus obtained microfine fiber is typically shown in the form of a side-by-side type as shown by (26) and (27) in Fig. 16. The fibers are used for various use applications, as they are, or by subjecting them to modification treatment such as [illegible] developing crimp by heating and/or by [illegible] sion of conjugate components of the fibers.

According to the spinneret device for conjugate melt-blow spinning of the present invention (items 1 to 3), since confluent grooves 17 are provided corresponding to the respective spinning nozzle 15 at the lower part of the separating plate 4, even when the viscosity unevenness, spinning temperature unevenness, etc. of the spinning resins occur to some extent at the cavity part of the nozzle plate 5, microfine fibers can be obtained which are uniform in the composite ratio and the cross-sectional, peripheral percentages of the respective components in the fiber cross-section, and yet small in the fineness unevenness. Further, the separating plate 4 is easy to subject the confluent grooves to be processed for engraving and possible to be manufactured at a low cost. Hence, it is possible to provide several separating plates each being different in the dimensions of the confluent grooves, carry out trial spinning and easily arrange a separate plate affording the optimum conjugate state corresponding to the respective spinning resins. Further, it is possible to arrange a nozzle plate having a broad width and a superior productivity. Further, according to the present invention of items 4 and 5 , a device wherein the separating plate 4 and the nozzle plate 5 are arranged in a narrow clearance D_1, has an effectiveness that, in addition to the above effectiveness, either of the bottom of the nozzle plate 5 and the lower part of the separating plate 4 are not damaged, so that the life of the device can be prolonged.

Claims

1. A spinneret device for side-by-side conjugate melt-blow spinning, provided with a spinning resins-feeding plate 2 having spinning resins-introducing grooves for introducing two kinds of spinning resins into distributing grooves of a distributing plate 3, respectively engraved therein; the distributing plate 3 having distributing grooves for distributing the spinning resins fed from the spinning resins-feeding plate 2; a nozzle plate 5 having a cavity 13 for receiving a separating plate 4 engraved on the back surface thereof, and also having holes 14 for introducing a conjugate component and spinning nozzles 15 bored successively on the bottom surface X of the cavity 13 thereof; a separating plate 4 having its bottom part engraved so that confluent grooves 17 for combining the above-mentioned different spinning resins may intersect the length direction of the grooves and also the confluent grooves 17 [illegible]

2. A spinneret device for side-by-side conjugate melt-blow spinning according claim 1, wherein the distributing grooves of the distributing plate 3 are engraved in the length direction of the back surface of the distributing plate 3; distributing holes for leading the spinning resins into grooves 13 for receiving the spinning resins, of the nozzle plate 5 are bored in the distributing grooves; partitioning walls are formed between the respective confluent grooves 17 of the separating plate 14; and the clearance for spouting a gas is formed between the nozzle plate 5 and a plate 6 for controlling the clearance for a gas, provided around the nozzle plate 5.

3. A spinneret device for side-by-side conjugate melt-blow spinning according to claim 1, wherein the bottom surface K of the walls for partitioning the confluent grooves of the separating plate 4 is closely contacted to the bottom surface X of the cavity of the nozzle plate 5.

4. A spinneret device for side-by-side, conjugate melt-blow spinning according to claim 1, wherein a narrow clearance D_1 is provided between the bottom surface K of the walls for partitining the confluent grooves of the separating plate 4 and the bottom surface X of the cavity of the nozzle plate 5 and D_1 is smaller than the width W_3 of the grooves 12 for controlling the pressure of the spinning resins.

5. A spinneret device for side-by-side conjugate melt-blow spinning according to claim 1, wherein a narrow clearance D_1 is provided between the bottom surface K of the walls for partitioning the confluent grooves of the separating plate 4 and the bottom surface X of the cavity of the nozzle plate, and the D_1 is smaller than either of the width W_3 of the grooves 12 for controlling the pressure of the spinning resins and the depth D_2 of the grooves 17.

6. A spinneret device for side-by-side conjugate melt-blow spinning according to claim 5, wherein the depth D_2 of the combining grooves of the separating plate 4 is smaller than the width W_3 of the grooves 12 for controlling the pressure of the spinning resins.

7. A spinneret device for side-by-side conjugate melt-blow spinning according to claim 2, wherein [illegible]

8. A spinneret device for side-by-side conjugate melt-blow spinning according to claim [illegible], wherein

a narrow clearance D_1 is provided between the bottom surface K of the walls for partitioning the confluent grooves of the separating plate 4 and the bottom surface X of the cavity of the nozzle plate 5 and D_1 is smaller than the width W_3 cf the grooves 12 for controlling the pressure of the spinning resins.

9. A spinneret device for side-by-side conjugate melt-blow spinning according to claim 2, wherein a narrow clearance D_1 is provided between the bottom surface K of the walls for partitioning the confluent grooves of the separating plate 4 and the bottom surface X of the cavity of the nozzle plate, and the D_1 is smaller than either of the width W_3 of the grooves 12 for controlling the pressure of the spinning resins and the depth D_2 of the grooves 17.

10. A spinneret device for side-by-side conjugate melt-blow spinning according to claim 9, wherein the depth D_2 of the grooves of the separating plate 4 is smaller than the width W_3 of the grooves 12 for controlling the pressure of the spinning resins.

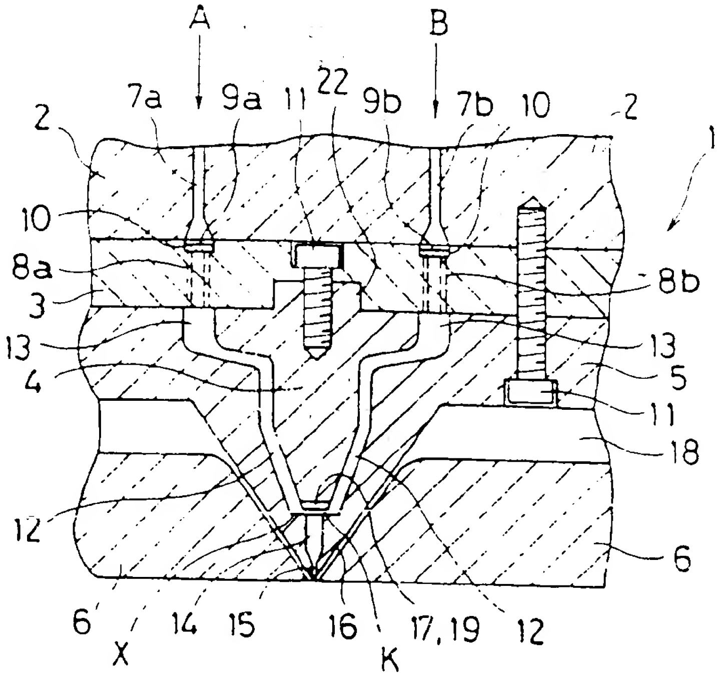


FIG.1.

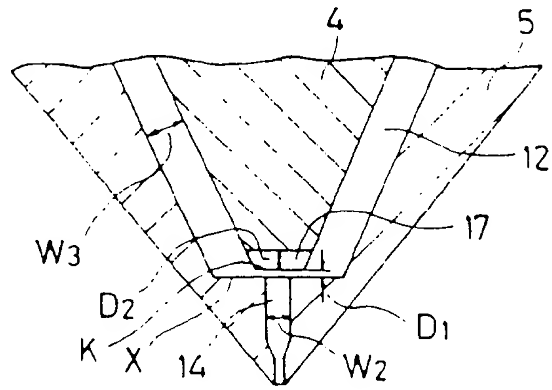


FIG.2.

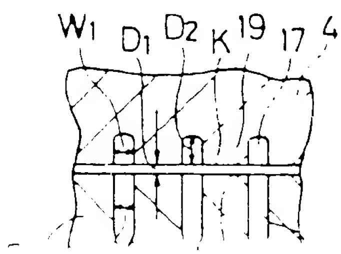


FIG.3.

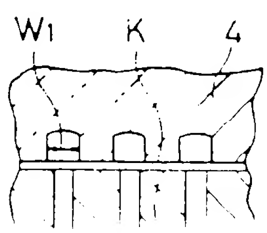


FIG.4.

FIG.5.

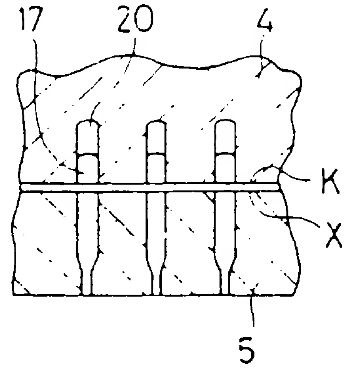


FIG.8.

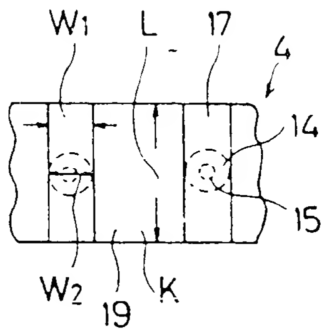


FIG.6.

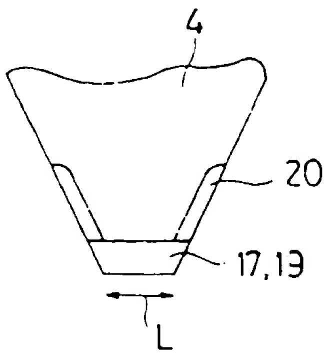


FIG.9.

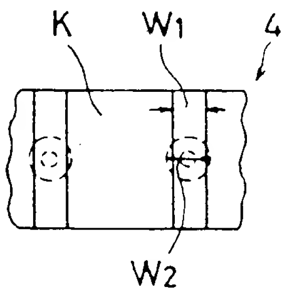


FIG.7.

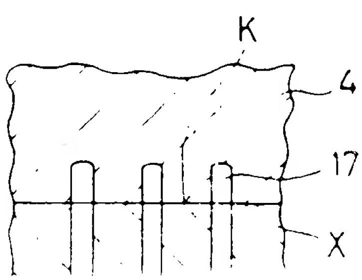


FIG.10.

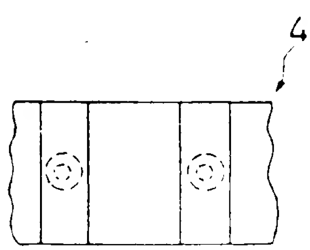


FIG.11.

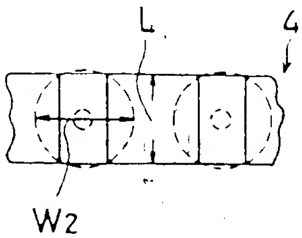


FIG.14.

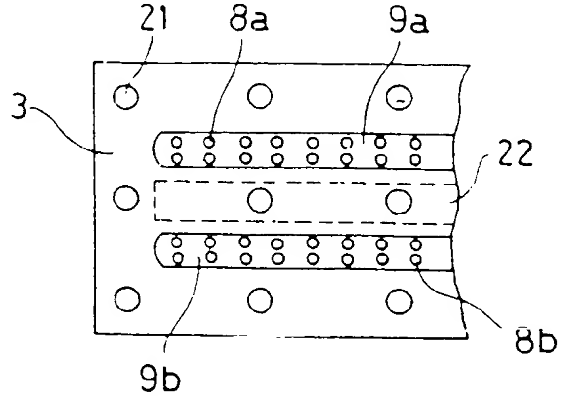


FIG.12.

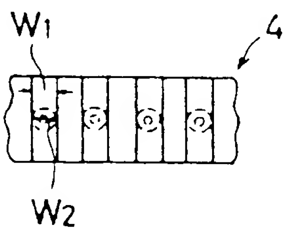


FIG.15.

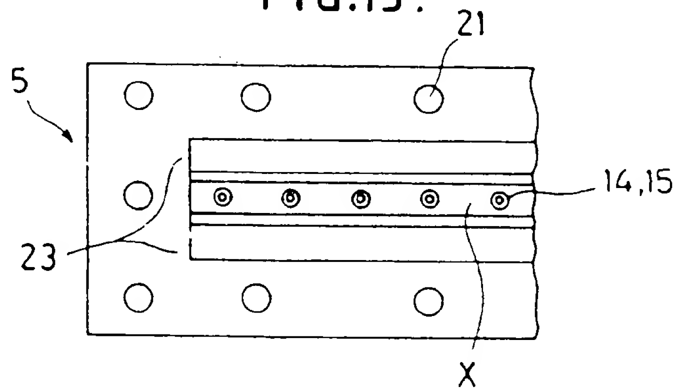


FIG.13.

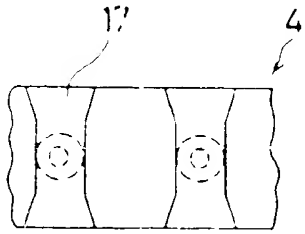
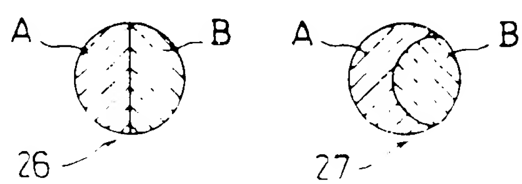


FIG.16.



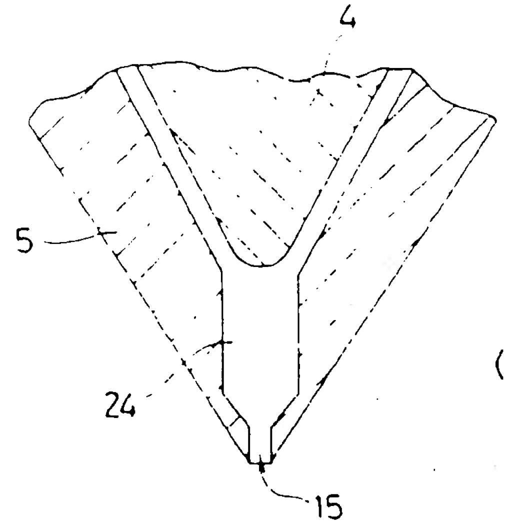


FIG.17.
(PRIOR ART)

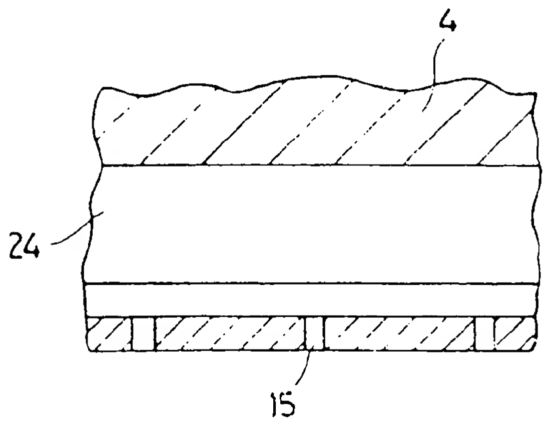


FIG.18.
(PRIOR ART)

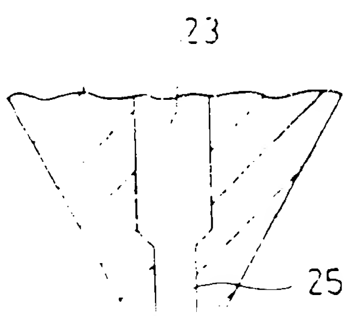


FIG.19.
(PRIOR ART)